```
*************************************************************
*                                                           *
*             QQQQQQQQ     ZZZZZZZZZ   XX      XX           *
*            QQQQQQQQQQ    ZZZZZZZZ     XX    XX            *
*            QQ      QQ        ZZ        XX XX              *
*            QQ      QQ       ZZ          XXX               *
*            QQ      QQ      ZZ           XXX               *
*            QQ   QQ QQ     ZZ           XX XX              *
*            QQQQQQQQQQ     ZZZZZZZZ    XX    XX            *
*             QQQQQQQQ     ZZZZZZZZZ   XX      XX           *
*                    QQ                                     *
*                                                           *
*************************************************************
```

The Journal Covering Amateur Radio & Sinclair Computers
ZX-80, Micro Ace, ZX-81, & Timex Sinclair 1000/1500
2025 O'Donnell Drive
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Alex F. Burr,K5XY 88001 Ambrose 'Bo' Barry,W4GHV/5
Publisher Editor

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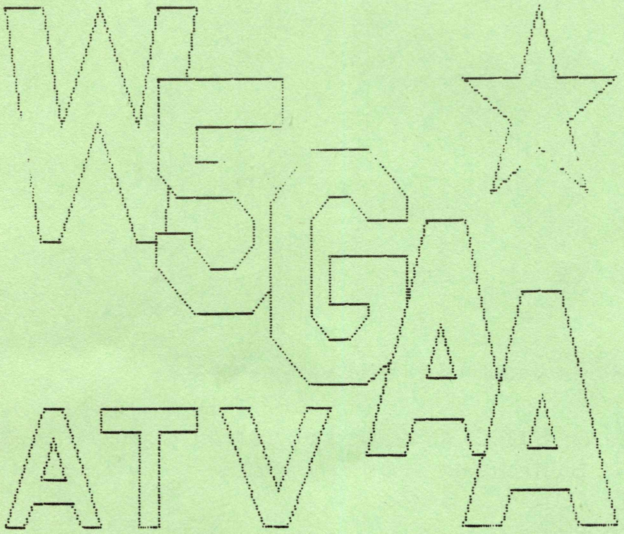
NOTICE

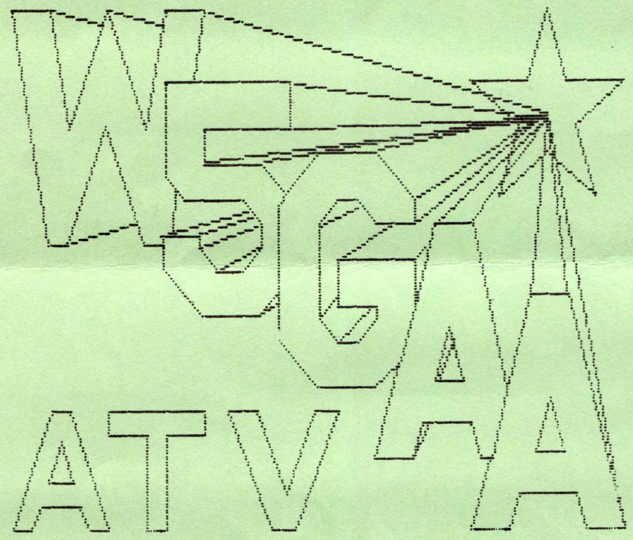
Your mailing label now includes the expiration date of your QZX subscription.

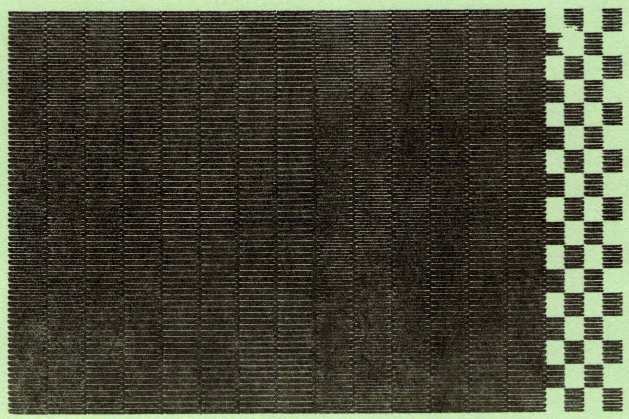
Timex (Computers) GO UNDER! QXZ remains AFLOAT!
(see 2/23/84 Wall Street Journal for details)

Details next issue plus info on Sir Clive's '32 bit' computer

TS-2068 ATV Program
Frank Bouldin, W5GAA







(PROGRAM ON PAGE 3)

QSL Print Program
Ed Truszkowski, KE6WB

I've lost track of the number of QSL printing programs we have printed so far, but each one has been a little different from the others. More importantly, each shows a creative endeavor on someone's part. Now, how can we stifle creative endeavor and stop printing QSL programs. Ed says this is his first (?) program, and that quite a lot of time was spent on it. This program requires 16K, by the way.

(PROGRAM ON PAGE 5)

Phased Vertical Antennas
Charles Milazzo, KP4MD

```
PROGRAM FOR PHASED VERTICAL
ANTENNA ARRAYS.
BY CHARLES F. MILAZZO, KP4MD

PROGRAM LISTING

  10 PRINT "NO. OF ELEMENTS",
  20 INPUT N
  30 PRINT N
  40 DIM A(N-1,4)
  50 PRINT ,,"ELE.    PHASE  REL
I  ANG    DIST0      0     1
  0        0"
  55 LET S=1
  60 FOR I=1 TO N-1
  70 PRINT I;
  80 FOR J=1 TO 4
  90 INPUT A
 100 PRINT TAB J*7;A;
 110 LET A(I,J)=A*PI/180
 120 IF J<>2 THEN GOTO 135
 125 LET S=S+A
 130 LET A(I,J)=A
 135 NEXT J
 140 PRINT
 150 NEXT I
 160 LET S=21/S
 170 CLS
 180 FAST
 190 LET VMAX=0
 200 FOR I=0 TO 2*PI STEP PI/36
 210 LET V=1
 230 FOR J=1 TO N-1
 240 LET V=V+A(J,2)*COS (A(J,1)+
A(J,4)*COS (I-A(J,3)))
 270 NEXT J
 280 LET V=ABS V
 290 IF V>VMAX THEN LET VMAX=V
 300 PLOT S*V*SIN I+31,S*V*COS I
+21
 310 NEXT I
 320 PRINT AT 0,0;"MAX. GAIN"
 330 PRINT VMAX
 340 STOP
 900 SAVE "ARRAY"
 950 RUN
```

SEE ANT. PATTERNS ON PAGE 5

W5GAA ATV PROGRAM

```
   1 CLS : BORDER 7: PAPER 7: IN
K 0: GO TO 9700
   2 BORDER 0: PAPER 0: INK 7
   3 CLS : LET b=7: LET p=0: GO
TO 5
   4 GO SUB 7500
   5 IF p>7 THEN GO TO 9500
   6 IF p>7 THEN LET p=0
   8 BORDER b
   9 PAPER p
  15 GO SUB 7500
  20 PAUSE 400
  30 LET X=0
  40 LET Y=0
 905 IF b>7 THEN LET b=0
1000 BRIGHT 1: PRINT AT X,Y; INK
 7;"████"
1010 LET X=X+1
1020 IF X=17 THEN GO TO 1999
1030 GO TO 1000
1999 LET X=0
2000 BRIGHT 0: PRINT AT X,Y+4; I
NK 6;"████"
2010 LET X=X+1
2020 IF X=17 THEN GO TO 3000
2030 GO TO 2000
3000 LET X=0
3010 PRINT AT X,Y+8; INK 5;"████
"
3020 LET X=X+1
3030 IF X=17 THEN GO TO 4000
3040 GØ TO 3010
4000 LET X=0
4010 PRINT AT X,Y+12; INK 4;"███
█"
4020 LET X=X+1
4030 IF X=17 THEN GO TO 5000
4040 GO TO 4010
5000 LET X=0
5010 PRINT AT X,Y+16; INK 3;"███
█"
5020 LET X=X+1
5030 IF X=17 THEN GO TO 6000
5040 GO TO 5010
6000 LET X=0
6010 PRINT AT x,y+20; INK 2;"███
█"
6020 LET x=x+1
6030 IF x=17 THEN GO TO 7000
6040 GO TO 6010
7000 LET x=0
7010 PRINT AT x,y+24; INK 1;"███
█"
7020 LET x=x+1
7030 IF x=17 THEN GO TO 7042
7040 GO TO 7010
7042 LET x=0
7045 PRINT AT x,y+28; INK 0;"███
█"
7050 LET x=x+1
7060 IF x=17 THEN GO TO 8000
7070 GO TO 7045
7500 INK 9: OVER 1
7510 PRINT AT 18,0;"█"
7512 PRINT AT 18,4;"█"
7514 PRINT AT 18,8;"█"
7516 PRINT AT 18,12;"█"
7518 PRINT AT 18,16;"█"
7520 PRINT AT 19,20;""
7522 PRINT AT 18,24;"█"
7524 PRINT AT 18,28;"█"
7548 INK 0: OVER 0
7550 RETURN
8000 GO SUB 7500: LET x=0
8010 PRINT AT x,y+28; INK 0;" █
█"
8020 LET x=x+1
8025 IF x=17 THEN GO TO 9000
8030 PRINT AT x,y+28; INK 0;"█ █
 "
8049 LET x=x+1
8060 GO TO 8010
8500 BORDER 7: PAPER 7: INK 0
8520 LET xxb=255
8530 LET yyb=175
8545 DRAW 0,yyb
8550 DRAW xxb,0
8560 DRAW 0,-yyb
8570 LET xxb=xxb-1
8580 DRAW -xxb,0
8590 LET yyb=yyb-1
8600 DRAW 0,yyb
8610 LET xxb=xxb-1
8620 DRAW xxb,0
8630 LET yyb=yyb-1
8635 IF yyb=-1 THEN PAUSE 120: G
O TO 8660
8640 DRAW 0,-yyb
8650 GO TO 8570
8660 BORDER 07: PAPER 7: INK 0:
GO TO 1
9000 PRINT AT 17,0;"



9002 GO SUB 7500
9003 PAUSE 600
9005 LET b=b-1
9010 IF b<0 THEN LET b=7
9012 LET p=p+1
9014 GO TO 4
9500 CLS : RESTORE : BORDER 7: P
APER 9: INK 0: LET x=0: LET y=0:
 LET xa=-1: LET xb=22: LET ya=-1
: LET yb=32
9510 READ c: INK c
9520 LET xa=xa+1: LET xb=xb-1
9530 LET ya=ya+1: LET yb=yb-1
9540 FOR x=xa TO xb: PRINT AT x,
ya;"█": NEXT x
9550 FOR y=ya TO yb: PRINT AT xb
,y;"█": NEXT y
9560 FOR x=xb TO xa STEP -1: PRI
NT AT x,yb;"█": NEXT x
9570 FOR y=yb TO ya STEP -1: PRI
NT AT xa,y;"█": NEXT y
9580 IF x=9 AND y=9 THEN PAUSE 6
00: GO TO 8500
9590 DATA 0,1,2,3,4,5,6,7,0,1,2,
3,4
9600 GO TO 9510
9700 CLS : BORDER 7: PAPER 7: IN
K 0: PLOT 0,175
9705 DRAW 16,0: DRAW 8,-40: DRAW
 16,40: DRAW 16,-40: DRAW 8,40:
DRAW 16,0
9710 DRAW -4,-24: DRAW 40,0: DRA
W 0,-16: DRAW -36,0: DRAW 0,-12:
 DRAW 24,0: DRAW 10,-10
9715 DRAW 14,14: DRAW 24,0: DRAW
 16,-16: DRAW 0,-8: DRAW -16,0:
DRAW -8,8: DRAW -8,0
9720 DRAW -8,-8: DRAW 0,-32: DRA
W 8,-8: DRAW 8,0: DRAW 8,8: DRAW
 0,4: DRAW -16,0: DRAW 0,16: DRA
W 32,0: DRAW 0,-16
9725 DRAW 8,28: DRAW 16,0: DRAW
14,-56: DRAW 10,32: DRAW 16,0: D
RAW 23,-79
9730 DRAW -16,0: DRAW -4,12: DRA
W -24,0: DRAW -4,-12: DRAW -16,0
: DRAW 8,24
9735 DRAW -4,0: DRAW -4,12: DRAW
 -20,0: DRAW -4,-12: DRAW -16,0:
 DRAW 10,32: DRAW -10,-8
9740 DRAW -24,0: DRAW -16,16: DR
AW 0,16: DRAW -8,-8: DRAW -24,0:
 DRAW -16,16
9745 DRAW 0,8: DRAW -8,0: DRAW -
16,40: DRAW -16,-40: DRAW -8,0:
DRAW -15,79
9750 PLOT 76,151: DRAW -12,0:
9755 DRAW 0,-32: DRAW 8,-8: DRAW
 24,0: DRAW 8,-8: DRAW 0,-8: DRA
W -8,-8: DRAW -8,0: DRAW -2,0: D
RAW -8,8: DRAW 0,4: DRAW -15,0:
DRAW 0,-2
9760 PLOT 68,115: DRAW -1,-15
9765 PLOT 116,115: DRAW -5,-6: D
RAW 0,-32
9770 PLOT 168,75: DRAW -6,-18
9775 PLOT 182,68: DRAW -6,-18: D
RAW 12,0: DRAW -6,18
9780 PLOT 205,46: DRAW -6,-22
9785 PLOT 224,44: DRAW -6,-18: D
RAW 12,0: DRAW -6,18
9790 INK 1: PLOT 0,0: DRAW 16,40
: DRAW 8,0: DRAW 16,-40: DRAW -8
,0: DRAW -4,8: DRAW -16,0: DRAW
-4,-8: DRAW -8,0: PLOT 20,30: DR
AW 5,-14: DRAW -10,0: DRAW 5,14
9795 PLOT 40,40: DRAW 40,0: DRAW
 0,-8: DRAW -16,0: DRAW 0,-32: D
RAW -8,0: DRAW 0,32: DRAW -16,0:
 DRAW 0,8
9800 PLOT 90,40: DRAW 12,0: DRAW
 12,-28: DRAW 12,28: DRAW 10,0:
DRAW -18,-40: DRAW -10,0: DRAW -
18,40
9810 LET x=191: LET y=151: PLOT
x,y: LET p=25
9812 PLOT x,y: LET Sa=.58779: LE
T Sb=.95106: LET Sc=.30902: LET
Ca=.80902: LET Cb=.30902: LET Cc
=.95630
9815 INK 2: DRAW Cc*p,0: DRAW Sc
*p,Cc*p: DRAW Sc*p,-Cc*p: DRAW C
c*p,0: DRAW -Ca*p,-Sa*p: DRAW Sc
*p,-Cc*p: FLASH 0
9820 DRAW -Ca*p,Sa*p: DRAW -Ca*p
,-Sa*p: DRAW Sc*p,Cc*p: DRAW -Ca
*p,Sa*p
9825 PAUSE 600
9830 INK 1: PLOT 223,140
9835 DRAW -141,34: PLOT 223,138:
 DRAW -105,12: PLOT 223,138: DRA
W -105,-3: PLOT 223,138: DRAW -1
42,-14
9840 PLOT 223,140: DRAW -118,-16
: PLOT 223,140: DRAW -70,-12: PL
OT 223,140: DRAW -55,-29: PLOT 2
23,140: DRAW -55,-37
9845 PLOT 223,138: DRAW -46,-35:
 PLOT 223,138: DRAW -32,-35: PLO
T 223,138: DRAW -7,-60: PLOT 223
,138: DRAW 8,-58
9850 PLOT 16,175: DRAW 22,-5: PL
OT 40,175: DRAW 22,-5: PLOT 223,
140: DRAW 32,-140
9855 PLOT 25,97: DRAW 26,6: PLOT
 62,99: DRAW 36,8: PLOT 76,99: D
RAW 24,6: PLOT 78,95: DRAW 24,7:
 PLOT 85,87: DRAW 18,8
9860 PLOT 103,72: DRAW 8,4: PLOT
 128,102: DRAW 16,6: PLOT 137,91
: DRAW 22,12: PLOT 128,71: DRAW
8,8: PLOT 136,63: DRAW 14,12: PL
OT 168,91: DRAW 4,4: PLOT 177,50
: DRAW 7,14: PLOT 167,24: DRAW 7
,12
9870 PAUSE 300: CLS : GO TO 2
```

W1EFK TE EDIT

DEAR OM 9 JAN 84

TEXT EDIT

THIS IS A SIMPLE ROUTINE THAT I FIND VERY USEFULL. I CURRENTLY HAVE IT AS PART OF MY QSL PROGRAM SO AS TO INCLUDE A PERSONAL MESSAGE.

```
8000 REM TEXT EDIT
8010 FAST
8015 INPUT A$
8020 IF LEN A$>32 THEN GOTO 8035
8025 LPRINT A$
8030 GOTO 8015
8035 LET C=0
8040 IF C=32 THEN GOTO 8055
8045 LET B$=A$(32-C)
8050 IF A$(33-C)=" " OR B$="," O
R B$=":" OR B$="." OR B$=";" OR
B$="?" OR B$=CHR$ 11 THEN GOTO 8
070
8055 LET C=C+1
8060 GOTO 8040
8065 LET C=0
8070 LPRINT A$( TO 32-C)
8075 LET A$=A$(33-C TO )
8080 IF A$(1)=" " THEN LET A$=A$
(2 TO )
8085 GOTO 8020
9000 PAUSE 800
9001 SAVE "TEX█"
```

NOTES:

1)USE (GOTO 8000) TO START.
2)FOR SPACE BETWEEN TEXT LINES USE (ENTER).
3)TO SAVE KEY (GOTO 9000) (ENTER) THEN START RECORDER. ROUTINE HAS ABOUT 15 SECS. DELAY TO GET BEYOND TAPE LEADER.

73 ROY W1EFK

W9BS PARALLEL RESISTORS

```
 5 REM "RES. IN PAR."
10 PRINT "ENTER RES. REQD."
20 INPUT A
30 FOR N=2 TO 200
40 LET X=A*N
50 LET Y=X/(N-1)
60 PRINT AT 21,0;X,Y;
70 SCROLL
80 NEXT N
```

RFI TO CWSS:HINTS AND TIPS

by Jon Harder, OE2ZDL/ K1US

Cliff, NU4V, has given us a super CW transceive program. The following ideas have helped me get more use from it by getting rid of unwanted interference to and from the computer. If you have been tearing your hair and wondering why the system crashes in operation, take a look at these suggestions:

1. Get rid of RF in the shack. It should all be going out the antenna anyway. I found that two ten -turn coils of feedline (six or eight inch diameter) formed effective RF chokes to keep radiated RF off the outside of the feedline. One coil is at the dipole feedpoint. The other is right where the coax enters the shack window. See ARRL Antenna Book, Page 5-9, figure 14 for how to do this.

2. Stop any RF travel between the transciever and the computer I/O board. I found that routing the audio and key line thru a 16 inch PVC tube stuffed with steel wool not only helped keep RF out of the computer, it stopped computer-generated interference with receiving. Note that as long as you can still hear substantial radiation from the computer, or the display flips during keying, there is more work to do. the system is still likely to be crash-prone.

3. If you still have problems, take a look at these DON'TS:

... Don't depend on the shielded key and audio line alone to bond the computer and rig. Use a heavy, short wire between the rig and computer case. (Mine is inside a keyboard enclosure that was picking up RF nicely.)

...Don't have the audio gain up while loading the tape. It may interrupt or do strange and unknown things to the machine language routines.

...Never tune the rig up while loading, for the same reason as above. Have it tuned and and ready to go before starting the load.

...Tape cables should be removed after loading, or coiled tightly out of the way.

... Hitting two keys at once or other typing fumbles can lead to a crash while sending. Take it slowly.

... Contrary to the order for sending canned messages suggested in the manual, it seems better to put the filler spaces in FIRST and then "=N" for the desired message. The computer likes the spaces first to allow it to switch over to send mode before it does any actual keying.

...Switching between modes is also a likely time for crashes. Do it carefully.

4. Here are some more tips that may help track down elusive RF problems:

...Unplug printer cables or other unneeded peripherals that may be picking up RF and feeding it to the bus.

...Check the power lead to see if it is resonant, say, at 28 mHz.

...Make a "stripped down" CWSS program tape to use while debugging the hardware. To do this, first pick an average sending speed and enter it, load up a few canned messages, then delete all the basic after the RAND USR lines and save the short program before running it. The ML routine will still recognize the control keys, and you will be able to reload and restart in two minutes after a crash. Wish I had thought of this earlier...it saves hours of frustration.

...Be sure and keep a hand key or keyer plugged in parallel to the I/O in case of a crash during QSO.

When you have finished debugging and deglitching your system, you will not only enjoy this fine program more, you will have learned a lot about the whys and wherefores of computer operation around RF. Some of the problems can be hard to snuff out, but there is nothing to equal the satisfaction of getting them under control. Don't give up. It is definitely worth the effort.

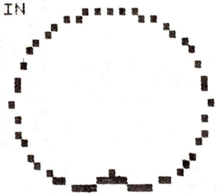
K3MD MOONBOUNCE PROGRAM

```
  10 REM "M1"
  12 REM THIS PROGRAM IS FOR PRI
NTOUT WITH A TV, BUT CAN BE EASI
LY MODIFIED FOR USE WITH THE TIM
EX 2040 PRINTER
  15 REM FOR 1984
  17 REM AVG PARAMETER IN L 1600
 IS 6.646055
  18 REM FOR 1985, 6.640374
  20 PRINT "K3MD MOONBOUNCE PROG
RAM FOR ZX81; ORIGIN ??WA0IQN (O
LD EIMAC TECH NOTE); TRANSLATED
FROM TRS80 BASIC PROGRAM OBTAINE
D FROM WA3DJG BY K3MD"
  30 PAUSE 160
 560 LET P5=2*3.1415926535
 570 LET D5=360/P5
 580 LET R5=P5/360
 590 REM INSERT UR OWN LAT/LONG
IN DEG,MIN W,N
 599 PRINT "LAT IN DEG,MIN IS 40
,31"
 600 LET L5=40
 605 LET U5=31
 610 PRINT "LONG IN DEG,MIN IS 7
9,54"
 615 LET U6=54
 620 LET L6=79
 630 LET L5=(L5+U5/60)*R5
 640 LET L6=(L6+U6/60)*R5
 650 PRINT "WHAT IS THE DESIRED
INC IN MIN?"
 660 INPUT I
 670 PRINT "DO YOU ONLY WANT PRI
NTOUT WHEN THE MOON IS NEAR THE
HORIZON? (Y OR N)"
 690 INPUT B$
 700 IF B$="Y" THEN GOTO 730
 710 LET I6=100
 720 GOTO 800
 730 PRINT "BELOW WHAT ELEVATION
 DO YOU WANT?"
 740 INPUT I6
 745 PRINT "INPUT GMT MONTH DESI
RED"
 755 INPUT F
 758 PRINT "DAY?"
 760 INPUT V
 765 PRINT "YEAR? (IN FULL)"
 766 REM YEAR IS FULL, E.G.1982
 770 INPUT Y
 780 IF B$="Y" THEN GOTO 900
 800 PRINT "INPUT GMT MONTH DESI
RED"
 801 INPUT F
 803 PRINT "DAY?"
 805 INPUT V
 809 PRINT "YEAR? (IN FULL)"
 815 INPUT Y
 820 PRINT "TIME BEGINNING?"
 830 INPUT Q
 835 PRINT "END?"
 837 INPUT S
 880 IF B$="Y" THEN GOTO 950
 890 GOTO 930
 900 LET E1=2400
 910 LET B=0
 920 GOTO 950
 930 LET E1=S
 940 LET B=Q
 950 LET M=F
 960 LET D=V
 970 LET Y=Y
 980 LET Y1=Y-(INT (Y/100)*100)
 990 CLS
1000 PRINT "POSITION OF MOON ON
";M;"/";D;"/";Y1;" IS:"
1025 SLOW
1030 PRINT "GMT";TAB 6;"AZ";TAB
12;"EL";TAB 17;"GHA";TAB 23;"DEC
"
1035 FAST
1060 LET I1=2
1080 IF M>=3 THEN GOTO 1160
1090 IF INT ((Y-1853)/4)<11 THEN
 GOTO 1120
1100 LET C1=-1
1110 GOTO 1130
1120 LET C1=0
1130 LET J1=365*(Y-1853)+D+30*(M
+9)+INT ((M+10)/2)
1140 LET J2=INT ((Y-1853)/4)+1+C
1
1150 GOTO 1270
1160 IF INT ((Y-1852)/4)<11 THEN
 GOTO 1190
1170 LET C1=-1
1180 GOTO 1200
1190 LET C1=0
1200 IF M=9 THEN GOTO 1240
1210 IF M=11 THEN GOTO 1240
1220 LET C2=0
1230 GOTO 1250
1240 LET C2=1
1250 LET J1=365*(Y-1852)+D+30*(M
-3)+INT ((M-2)/2)
1260 LET J2=INT ((Y-1852)/4)+C1+
C2
1270 LET J=J1+J2
1280 LET T1=J-17472.5
1290 LET D9=(B-INT (B/100)*100)+
INT (B/100)*60
1300 LET D6=(E1-INT (E1/100)*100
)+INT (E1/100)*60
1310 LET D7=D9-D6
1320 LET D8=D7-I
1330 IF D7>0 THEN GOTO 1350
1340 GOTO 1380
1350 IF D8>=-I THEN GOTO 2220
1360 LET B=E1
1380 LET T=(B-INT (B/100)*100)/1
440+INT (B/100)/24
1390 LET T5=T1+T
1400 LET K1=((.751213+.036601102
*T5)-INT ((.751213+.036601102*T5
)))*P5
1410 LET K2=((.822513+.036291645
7*T5)-INT ((.822513+.0362916457*
T5)))*P5
1420 LET K3=((.995766+.002737778
52*T5)-INT ((.995766+.0027377785
2*T5)))*P5
1430 LET K4=((.974271+.033863192
2*T5)-INT ((.974271+.0338631922*
T5)))*P5
1440 LET K5=((.0312525+.03674819
57*T5)-INT ((.0312525+.036748195
7*T5)))*P5
1450 LET L8=K1+.658*R5*SIN (2*K4
)+6.289*R5*SIN (K2)
1460 LET L8=L8-1.274*R5*SIN (K2-
2*K4)-.186*R5*SIN (K3)
1470 LET L8=L8+.214*R5*SIN (2*K2
)-.186*R5*SIN (K3)
1480 LET L8=L8-.059*R5*SIN (2*K2
-2*K4)-.057*R5*SIN (K2+K3-2*K4)
1490 LET K6=K5+.6593*R5*SIN (2*K
4)+6.2303*R5*SIN (K2)-1.272*R5*S
IN (K2-2*K4)
1500 LET L7=5.144*R5*SIN (K6) .1
46*R5*SIN (K5-2*K4)
1510 LET D1=COS (L7)*SIN (L8)*.3
97821+SIN (L7)*.917463
1530 LET D1=ATN (D1/(SQR (1-D1*D
1)))
1540 LET A2=COS (L7)*COS (L8)/CO
S (D1)
1550 LET A1=(COS (L7)*SIN (L8)*.
917463-SIN (L7)*.397821)/COS (D1
)
```

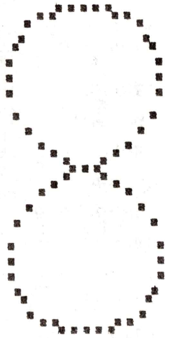
```
1560 LET A=ATN (A1/A2)
1570 GOSUB 1870
1580 LET R1=A
1590 LET L1=.065709822*T1
1600 LET L=T*24*1.002738+6.59057
9+(L1-INT (L1/24)*24)
1610 LET L=L-(INT (L/24)*24)
1630 LET G=(L/24)*P5-R1
1640 IF G<P5 THEN GOTO 1670
1650 LET G=G-P5
1660 GOTO 1710
1670 IF G<0 THEN GOTO 1690
1680 GOTO 1710
1690 LET G=G+P5
1710 LET H=L6-G
1730 LET E3=COS (L5)*COS (H)*COS
 (D1)+SIN (D1)*SIN (L5)
1740 LET E2=SQR (1-(E3*E3))
1750 LET E=ATN (E3/E2)
1760 IF E<0 THEN GOTO 2170
1770 IF E>I6*R5 THEN GOTO 2170
1790 LET A2=SIN (D1)/(COS (L5)*C
OS (E))
1800 LET A2=A2-(SIN (L5)/COS (L5
))*(SIN (E)/COS (E))
1810 LET A1=SIN (L5)*SIN (D1)+CO
S (L5)*COS (D1)*COS (H)
1820 LET A1=(SIN (H)*COS (D1))/(
SQR (1-A1*A1))
1830 LET A=ATN (A1/A2)
1840 GOSUB 1870
1850 GOTO 2020
1870 IF A=0 THEN GOTO 1870
1880 GOTO 1930
1890 IF A2<0 THEN GOTO 1910
1900 GOTO 2010
1910 LET A=P5/2
1920 GOTO 2010
1930 IF A>0 THEN GOTO 1990
1940 IF A2<0 THEN GOTO 1970
1950 LET A=P5+A
1960 GOTO 2010
1970 LET A=P5+(A-P5/2)
1980 GOTO 2010
1990 IF A2>=0 THEN GOTO 2010
2000 LET A=A+P5/2
2010 RETURN
2020 IF (T-I1)>(2*I)/1440 THEN G
OTO 2040
2030 GOTO 2145
2040 PRINT
2145 LET A=INT (A*D5*10+.5)/10
2146 LET E=INT (E*D5*10+.5)/10
2147 LET G=INT (G*D5*10+.5)/10
2148 LET D1=INT (D1*D5*10+.5)/10
2149 LET GM=INT (B+.5)
2150 SLOW
2155 PRINT GM;TAB 6;A;TAB 12;E;T
AB 17;G;TAB 23;D1
2159 FAST
2160 LET I1=T
2170 LET B=B+I
2180 LET Z=(B-INT (B/100)*100)-6
0
2190 IF Z<0 THEN GOTO 1290
2200 LET B=INT (B/100)*100+100+Z
2210 GOTO 1290
3000 PRINT "END"
9999 STOP
```

KP4MD ANTENNA PATTER

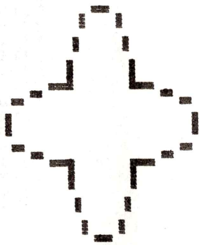
```
SAMPLE RUN

NO. OF ELEMENTS 2

ELE.     PHASE  REL I   ANG      DIST
0        0      1       0        0
1        -90    1       0        90

MAX. GAIN
2
```



```
NO. OF ELEMENTS 2

ELE.     PHASE  REL I   ANG      DIST
0        0      1       0        0
1        180    1       0        160

MAX. GAIN
2
```



```
NO. OF ELEMENTS 3

ELE.     PHASE  REL I   ANG      DIST
0        0      1       0        0
1        180    1       135      180
2        180    1       225      180

MAX. GAIN
2.2113997
```



KE6WB QSL CARD PROGRAM

PROGRAM:-"QSL-CRD"

BY ED TRUSZKOWSKI,KE6WB

JANUARY,1984

YES, ANOTHER QSL PROGRAM, BUT FEATURING HORIZONTAL PRINTING OF THE CALLSIGN.

THE USERS CALLSIGN IS LOADED INTO MEMORY ONE TIME. VARIABLES ARE ENTERED ACCORDING TO PARTICULARS OF EACH QSO.

TYPE PROGRAM AS LISTED.

TYPE IN 43 DOTS BETWEEN QUOTES IN 1 REM.

BE SURE AND TURN ON PRINTER. BECAUSE THIS PROGRAM IS RUN IN FAST, THE SCREEN WILL GO BLANK AFTER TYPING IN THE VARIABLES AND BETWEEN UPPER AND LOWER PRINT OUT OF CARD.

AFTER TYPING IN THE PROGRAM, CHOOSE LOADING ROUTINE CORRESPONDING TO YOUR CALLSIGN AND ENTER IN REVERSE ORDER YOUR CALLSIGN BY TYPING THE CODE OF EACH CHARACTER IN PLACE OF THE BRITISH POUND SIGN,IN CONSECUTIVE ORDER (LEFT TO RIGHT, TOP TO BOTTOM), TYPING "0" WHERE INDICATED.

TYPE "RUN" AND BEGIN ENTERING NUMBERS ONE AT A TIME. THEY WILL BE DISPLAYED ON THE SCREEN AS ENTERED.

WHEN ENTERING THE LETTER "Y",
WHEN ENTERING THE LETTER "Y",
SHIFT ALL ENTRIES FOLLOWING "Y"
 1 PLACE TO THE RIGHT.

NOTE: SOME COMBINATIONS USING THE LETTER "Y" WILL NOT WORK.

ONCE THE CALLSIGN IS ENTERED, SAVE ON TAPE BY "GOTO 5240". AFTER THIS, TO RUN PROGRAM, "GOTO 285".

THE FOLLOWING LIST CONTAINS THE CALLSIGN LETTERS AND NUMBERS WITH THEIR CODES.

```
A  B  C  D  E  F  G  H  I  J  K
--------------------------------
31 22 18 12 33 32 22 63 33 62 1
36 41 33 18 41 40 37 8  33 1  34
36 41 33 33 41 40 37 8  63 1  20
36 41 33 33 41 40 33 8  33 1  8
36 41 33 33 41 40 33 8  33 1  8
31 63 30 63 63 63 30 63 0  6  63

L  M  N  O  P  Q  R  S  T  U  V
--------------------------------
1  63 63 30 24 30 25 6  32 62 60
1  16 2  33 36 33 38 41 32 1  2
1  8  4  33 38 35 36 41 63 1  1
1  8  8  33 36 37 36 41 32 1  1
1  16 16 33 36 33 36 41 32 1  2
63 63 63 30 63 30 63 18 0  62 60

W  X  Y  Z  1  2  3  4  5  6  7
--------------------------------
62 33 32 33 1  25 22 2  38 6  48
1  18 16 49 1  37 41 2  41 41 40
2  12 8  41 63 37 41 63 41 41 36
2  12 7  37 33 37 33 18 41 41 35
1  18 8  35 17 37 33 10 41 41 32
62 33 16 33 0  19 18 6  58 30 32
      32

8  9  0
--------
22 30 30
41 37 49
41 37 41
41 37 37
41 37 35
22 24 30
```

```
4 CHARACTER          5 CHARACTER
CALLSIGN             CALLSIGN

0 0 0 0 0 0 0        0 0 0 0 £ £ £
£ £ £ £ £ £ 0        £ £ £ 0 £ £ £
£ £ £ £ £ £ 0        £ £ £ 0 £ £ £
£ £ £ £ £ £ 0        £ £ £ 0 £ £ £
£ £ £ £ £ £ 0        £ £ £ 0 £ £ £
0 0 0 0 0 0 0        £ £ £ 0 0 0 0
0                    0

6 CHARACTER
CALLSIGN

£ £ £ £ £ £ 0
£ £ £ £ £ £ 0
£ £ £ £ £ £ 0
£ £ £ £ £ £ 0
£ £ £ £ £ £ 0
£ £ £ £ £ £ 0
0

5 CHARACTER CALLSIGN
EXAMPLE FOLLOWS:-BW6EK

 0  0  0 0 22 41 41
41 41 63 0 62  1  2
 2  1 62 0  6 41 41
41 41 30 0 33 41 41
41 41 63 0  1 34 20
 8  8 63 0  0  0  0
 0
```

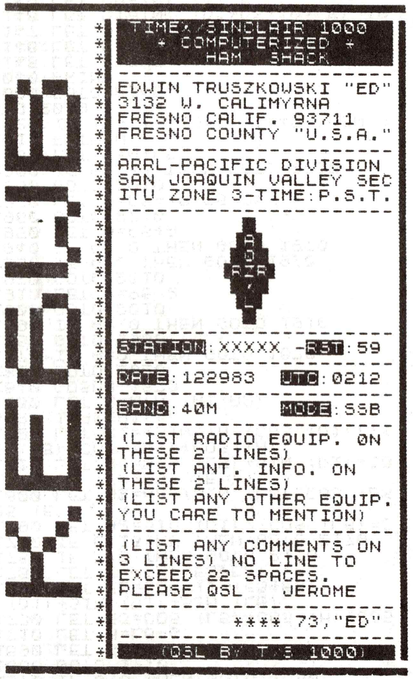
IF AN ERROR IS MADE DURING INPUT PRESS 5 AND ENTER TO START OVER.

IF YOU HAVE ANY DIFFICULTY WITH THIS PROGRAM, OR WOULD BE INTERESTED IN A CASSETTE (BOTH SIDES), INCLUDING A COMPLETE PRINTOUT FROM 2040 PRINTER, WRITE TO:
ED TRUSZKOWSKI
3132 W. CALIMYRNA
FRESNO, CA. 93711
SEND CHECK OR MONEY ORDER IN TH AMOUNT OF $7.50 IF YOU WANT CASSETTE AND PRINT OUT OF PROGRAM. FOR INFORMATION OR ASSISTANCE PLEASE SEND S.A.S.E..

```
16514..0          16515..0
16516..0          16517..0
16518..22         16519..41
16520..41         16521..41
16522..41         16523..63
16524..0          16525..62
16526..1          16527..2
16528..2          16529..1
16530..62         16531..0
16532..6          16533..41
16534..41         16535..41
16536..41         16537..30
16538..0          16539..33
16540..41         16541..41
16542..41         16543..41
16544..63         16545..0
16546..1          16547..34
16548..20         16549..8
16550..8          16551..63
16552..0          16553..0
16554..0          16555..0
16556..0
```

KE6WB QSL PROGRAM

```
STATION:XXXXX
RST:  59
DATE:   122983
UTC:  0212
BAND:   40M
MODE:   SSB
NAME:   JEROME
QSL?:  PLEASE QSL
RIG:  (LIST RADIO EQUIP. 0N
      THESE 2 LINES)
ANT:  (LIST ANT. INFO. ON
      THESE 2 LINES)
OTHER:  (LIST ANY OTHER EQUIP.
        YOU CARE TO MENTION)
REMARKS:  (LIST ANY COMMENTS ON
          3 LINES) NO LINE TO
          EXCEED 22 SPACES.

TYPE 1ST LINE OF 3 WITH INFO (22
 SPACES)
```



```
TIMEX/SINCLAIR 1000
  + COMPUTERIZED +
     HAM  SHACK
----------------------
EDWIN TRUSZKOWSKI "ED"
3132 W. CALIMYRNA
FRESNO CALIF. 93711
FRESNO COUNTY "U.S.A."
----------------------
ARRL-PACIFIC DIVISION
SAN JOAQUIN VALLEY SEC
ITU ZONE 3-TIME:P.S.T.
----------------------
----------------------
STATION:XXXXX -RST:59
----------------------
DATE:122983   UTC:0212
----------------------
BAND:40M      MODE:SSB
----------------------
(LIST RADIO EQUIP. 0N
THESE 2 LINES)
(LIST ANT. INFO. ON
THESE 2 LINES)
(LIST ANY OTHER EQUIP.
YOU CARE TO MENTION)
----------------------
(LIST ANY COMMENTS ON
3 LINES) NO LINE TO
EXCEED 22 SPACES.
PLEASE QSL   JEROME
----------------------
         **** 73,"ED"
----------------------
   (QSL BY T/S 1000)
```

```
  12 IF A=5 THEN PRINT AT 21,0;"
 PRESS RUN AND START OVER"

   1 REM ..........................
 .....................
   4 FAST
   5 FOR I=16514 TO 16556
  10 INPUT A
  15 POKE I,A
  20 PRINT I;"..";PEEK (I),
  25 NEXT I
  30 PAUSE 400
  35 CLS
 285 DIM C$(6)
 288 DIM C$(6)
 289 DIM S$(3)
 290 DIM D$(6)
 291 DIM T$(4)
 292 DIM B$(3)
 293 DIM M$(4)
 294 DIM N$(8)
 295 DIM Q$(12)
 296 DIM E$(22)
 297 DIM F$(22)
 298 DIM G$(22)
 299 DIM H$(22)
 300 DIM U$(22)
 301 DIM V$(22)
 302 DIM X$(22)
 303 DIM Y$(22)
 304 DIM Z$(22)
 305 FAST
 310 PRINT AT 2,0;"STATION:"
 320 INPUT C$
 330 IF LEN C$>6 THEN GOTO 320
 340 PRINT AT 2,8;C$
 350 PRINT AT 3,0;"RST:"
 360 INPUT S$
 370 IF LEN S$>3 THEN GOTO 360
 380 PRINT AT 3,5;S$
 390 PRINT AT 4,0;"DATE:"
 400 INPUT D$
 410 IF LEN D$>6 THEN GOTO 400
 420 PRINT AT 4,7;D$
 430 PRINT AT 5,0;"UTC:"
 440 INPUT T$
 450 IF LEN T$>4 THEN GOTO 440
 460 PRINT AT 5,5;T$
 470 PRINT AT 6,0;"BAND:"
 480 INPUT B$
 490 IF LEN B$>4 THEN GOTO 480
 500 PRINT AT 6,7;B$
 510 PRINT AT 7,0;"MODE:"
 520 INPUT M$
 530 IF LEN M$>4 THEN GOTO 520
 540 PRINT AT 7,7;M$
 550 PRINT AT 8,0;"NAME:"
 560 INPUT N$
 570 PRINT AT 8,7;N$
 580 PRINT AT 9,0;"QSL?:";AT 20,
0;"TYPE ""PLEASE QSL"" OR ""TNX
FOR QSL"""
 590 INPUT Q$
 600 PRINT AT 9,6;Q$
 610 PRINT AT 10,0;"RIG:";AT 20,
0;"TYPE 1ST LINE OF 2 WITH INFO
(22 SPACES)"
 620 INPUT E$
 630 PRINT AT 10,5;E$
 640 INPUT F$
 650 PRINT AT 11,5;F$
 660 PRINT AT 12,0;"ANT:";AT 20,
0;"TYPE 1ST LINE OF 2 WITH INFO
(22 SPACES)"
 670 INPUT G$
 680 PRINT AT 12,5;G$
 690 INPUT H$
 700 PRINT AT 13,5;H$
 710 PRINT AT 14,0;"OTHER:";AT 2
0,0;"TYPE 1ST LINE OF 2 WITH INF
O (22 SPACES)."
 720 INPUT U$
 730 PRINT AT 14,7;U$
 740 INPUT V$
 750 PRINT AT 15,7;V$
 760 PRINT AT 16,0;"REMARKS:";AT
 20,0;"TYPE 1ST LINE OF 3 WITH I
NFO (22 SPACES)"
 770 INPUT X$
 780 PRINT AT 16,9;X$
 790 INPUT Y$
 800 PRINT AT 17,9;Y$
 810 INPUT Z$
 820 PRINT AT 18,9;Z$
 830 PAUSE 400
 840 CLS
 850 GOTO 4980
1000 PRINT AT 1,9;" TIMEX/SINCLA
IR 1000  "
1010 PRINT AT 2,9;"    + COMPUTER
IZED +    "
1020 PRINT AT 3,9;"          HAM  S
HACK      "
1030 PRINT AT 4,9;"-------------
---------"
1040 PRINT AT 5,9;"EDWIN TRUSZKO
WSKI ""ED"""
1050 PRINT AT 6,9;"3132 W. CALIM
YRNA"
1060 PRINT AT 7,9;"FRESNO CALIF.
 93711"
1070 PRINT AT 8,9;"FRESNO COUNTY
 ""U.S.A."""
1080 PRINT AT 9,9;"-------------
---------"
1090 PRINT AT 10,9;"ARRL-PACIFIC
 DIVISION"
1100 PRINT AT 11,9;"SAN JOAQUIN
VALLEY SEC"
1110 PRINT AT 12,9;"ITU ZONE 3-T
IME:P.S.T."
1120 PRINT AT 13,9;"------------
----------"
1130 PRINT AT 14,19;"█"
1140 PRINT AT 15,18;"█A█"
1150 PRINT AT 16,18;"█Q█"
1160 PRINT AT 17,17;"█RIR█"
1170 PRINT AT 18,18;"█X█"
1180 PRINT AT 19,18;"█L█"
1190 PRINT AT 20,19;"█"
1200 PRINT AT 21,9;"------------
----------"
1210 COPY
1220 GOTO 5120
1230 PRINT AT 0,9;"STATION:";AT
0,17;C$;AT 0,24;"RST:";AT 0,28;S
$
1240 PRINT AT 1,9;"-------------
---------"
1250 PRINT AT 2,9;"DATE:";AT 2,1
4;D$;AT 2,22;"UTC:";AT 2,26;T$
1260 PRINT AT 3,9;"-------------
---------"
1270 PRINT AT 4,9;"BAND:";AT 4,1
4;B$;AT 4,22;"MODE:";AT 4,27;M$
1280 PRINT AT 5,9;"-------------
---------"
1290 PRINT AT 6,9;E$;AT 7,9;F$
1300 PRINT AT 8,9;G$;AT 9,9;H$
1310 PRINT AT 10,9;U$;AT 11,9;V$
1315 PRINT AT 12,9;"------------
----------"
1320 PRINT AT 13,9;X$;AT 14,9;Y$
;AT 15,9;Z$
1330 PRINT AT 16,9;Q$;AT 16,22;N
$
1340 PRINT AT 17,9;"------------
----------"
1350 PRINT AT 18,18;"**** 73,""E
D"""
1360 PRINT AT 19,9;"------------
----------"
1370 PRINT AT 20,9;"    (QSL BY T
/S 1000)  "
1380 PRINT AT 21,0;"▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀
▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀"
1390 COPY
1395 STOP
1400 FOR I=31 TO 0 STEP -1
1410 PRINT AT 21,I;CHR$ 3
1420 NEXT I
1430 RETURN
4980 GOSUB 1400
5000 FOR J=16514 TO 16534
5005 SCROLL
5010 LET A=PEEK J
5020 FOR I=5 TO 0 STEP -1
5030 PRINT AT 21,I;CHR$ ((A-2*IN
T (A/2))*128)
5040 LET A=INT (A/2)
5050 PRINT AT 21,7;CHR$ 23
5060 PRINT AT 21,8;CHR$ 5
5070 PRINT AT 21,31;CHR$ 133
5080 NEXT I
5100 NEXT J
5110 GOTO 1000
5120 FOR J=16535 TO 16555
5130 LET A=PEEK J
5140 FOR I=5 TO 0 STEP -1
5150 PRINT AT 21,I;CHR$ ((A-2*IN
T (A/2))*128)
5160 LET A=INT (A/2)
5170 PRINT AT 21,7;CHR$ 23
5180 PRINT AT 21,8;CHR$ 5
5190 PRINT AT 21,31;CHR$ 133
5200 NEXT I
5210 SCROLL
5220 NEXT J
5230 GOTO 1230
5240 CLS
5245 SAVE "QSL-CR█"
5250 GOTO 285
```

BITS AND BYTES

34. WB3JDP made a loading meter by putting a sensitive dc meter across the ear jack and adjusting a series resistor until 5v p-p read 3/4 scale and then enclosed the whole thing in a small metal box with jacks to take wires to the computer and the tape recorder.

35. IW2BZT says that he soved all his loading problems by using a G.E. computer tape recorder and radio shack 10 minute cassettes.

36 H. Root says that he finds that empty toilet paper rolls make great storage devices for his printer programs from the Timex printer.

BE SURE TO STORE THEM <u>OUTSIDE</u> THE BATHROOM!

W4GHV

Assembly Language Made 'Simple'

Bo Barry, W4GHV

The above title is both a bit misleading and a 'substitute' for the Editor's Doings this month. No, I'm still not done with my RTTY setup, but it's still on the front burner. I think I have mentioned earlier that assembly language programming is a bit addicting. Well, I was a bit fascinated and confused by an article in the Jan/Feb 1984 issue of Sync Magazine entitled Highway Robbery, by Sheldon Maloff. I put the Scientific Software Assembler/Debugger (see unclassified ads) to task and worked on the source code for this game program. I thought it would be educational and could be described in a manner to be of value to others trying to learn assembly language programming. I will admit that it took quite a bit longer to get the program debugged than it should have, but I had fun.

There are several ways to get your feet wet: wade in slowly waiting for the water temperature to be tolerable or to jump in all at once. In other words, you can read, read, read, and then try to create and run some machine code or you can take a more advanced work done by someone else and try to get it going. After accomplishing this seemingly simple task (HA), you can then begin to modify it to do more than originally intended. This approach sort of separates the learning and creativity aspects of the task temporarily and often makes it easier for some. This article is made for those willing to 'take the plunge' but perhaps enough information will be given for the timid to simply write a REM and poke in the code to see how the game works. Like a good teacher, I have to use a bit of bribery: if you find my article interesting and actually get the program running, send me a note and I will extend your sub by a month. Find the bug that I have found, but left in the program, and I will extend your sub another month.

First, this effort was done with the Scientific Software Assembler/Debugger, but the technique would be similar for other assemblers. I have reprinted the 'so called' source code and the hex codes for the game and my finished product is included. The article was heavily laden with errors, neither the hex code alone nor the source code alone would have been enough for me to get it debugged. I will discuss some of the bugs to show how I resolved them.

The first 5 lines of the original source listing indicate some labels, but no instructions. They are reserved memory locations used to store the game title that is displayed, the car position, score, and a random number. The actual amount of storage required is not given. I usually 'start' my program at the beginning and put the storage at the end. By looking at the hex code, by referring to the ZX/TS manual, and by looking at the related instructions and using the labels, I was able to figure out their sizes. I noted the program START LD A instruction as being the 3A in the hex listing and worked backwards. This also means that when put into a REM statement the calling address is not 16514 but is 16553. The resulting reserved locations are line numbers 205-226 in my listing. I had to dig up the Sinclair labels in the manual to define them and they are lines 4000-4020. Down the code a ways is a LD DE,148 which sets up the horizontal position of the car. I followed the comments in the mag article and reduced it a bit, down to 140 (8C hex), to move it left a bit allowing more reflex time for oldtimers. The most important bug, is the label BLACK, which loads the B accumulator with 90H. Down a bit you see a DJNZ instruction, which decrements the value of B and jumps back if B is not 0. Well it jumps back to BLACK which reloads B! I got a nice black screen and nothing else when I ran the program. Needless to say, I moved the BLACK label down one instruction to fix it. The assembler I used only uses hex values (preceded with a $), so I had to do a few conversions from decimal to hex. No arithmetic is allowed in the instructions, so 3 lines below the label DIVIDE I had to add a label for the relative jump. Next, in the line above BRICK, the value to ADD to A was missing, so I picked it up from the hex listing. The label TIME was also screwed up, so I moved it down one line. There is nothing wrong with TIME DJNZ TIME, it will simply keep decrementing B until it is 0. The use of commas, and spaces is a bit tricky and varies between assemblers. Note no comma was used in my DJNZ instruction. One other peculiarity with this assembler is that a LD A instruction has to be $XX for a one byte load and a LD HL has to be $XXXX for a two byte load. You have to use leading zeros if necessary and have the right length. No problem once you get used to it.

Here's how I got it going: I loaded the assembler, then reserved a 294 byte long 104 REM statement, which is the first line number you are supposed to use. Leaving a little room for the program needed to run the game, I started at line 200 with REMs, entering the source code. The object (hex) code to be created ORGs (originates) at 5CBC hex, the first free location after the assembler. For initial assembling & debugging with the assembler resident, line 108 should initially read RAND USR 23779 to line up with that START LD A instruction. Line 201 is left out initially. The source code is entered in REM statements, putting label names immediately after the REM (including the 'free' space with the REM). If a line has no label, you space over at least one space for the instruction. I usually go over several, but the printout on my printer wrapped around too much, messing things up. The title message was entered in 'words' so that I could see all the hex codes, if you do it in an ASCII message format the assembler does not list it out completely, even though it still puts the code in memory. Note the word & byte size reservations in lines 221-226 to match up with the size of the intended accumulators (1or 2 bytes wide). Keep on going, entering the source, stopping to save a copy on tape occasionally. When you do a SAVE, the assembler is saved along with your program, so its easy to re-load. Be careful with the spaces and commas! Line 4200 may not be required by this assembler, its a habit from my TRS days. Don't forget the END statement, space over a space to get out of the label field. Now wasn't that easy? Next, you RUN the assembler, telling it to start with line # 200, and hope for a 0 errors message! Then go for a hard copy if you have a printer. If you haven't entered lines 105-110 insert them. SAVE on tape and then 'go for it' as the video arcades say. Instead of RUN, enter GOTO 106. If luck is on your side you can use the A & L keys to move your car up and down to pick up lots of $ but you have to dodge the squares (=brick walls). Once you crash hit the 1 key to terminate. Didn't go that way?? If you are able to BREAK and resume control, you are lucky, if not, re-load the tape. You can either RUN again, re-assembling and listing your code to look for errors or you can RUN and enter the DEBUG mode and examine/change memory contents. You can insert breakpoints (temporary stops) into the code if you know what you are doing. I'll leave that up to you. If you find and eliminate the bugs, enter GOTO 106 again and try again. For now you will have to hit the 1 key and GOTO 106 to restart each game.

Happy with your results, you next insert line 201, enter RUN & re-assemble the code. It will now be located starting at 4082 hex (16514) AFTER you delete the assembler. This relocate feature is pretty nice. Change line 108 to RAND USR 16553, do a POKE 16511,54; POKE 16512,28 and enter 1 ENTER. This removes the assembler and line 104 is now the first line. That line and lines 105-110 are all we need now, but the remaining source code remains. Does anyone have a way of deleting a bunch of lines?? Change line 110 to GOTO 107 for continuous game playing without a RUN after each game. Now, save this final reduced size version of the game. This is the one you need to give to the kids.

That's all there is to it! Now a few tips for the timid, or those with 1K machines. You can take the hex loader program, entering MY hex codes making no typing errors and get the game going in a 1K machine (I think). The machine code for the game is only 294 bytes. The required hex codes are in the third column of the assembler source listing (8D at line 205 is the first one). Do not use the original hex listing, it has bugs. If you cannot get them entered correctly you will have to write SYNC for a copy of the article. The author tells you how to debug his un-debugged code in the article. Then delete lines 20-70, add 20 RAND USR 16553, 30 CLS, & 40 GOTO20 and it should work. I didn't test this method, remember I jumped into the deep water, wading is for kids! I almost drown until I remembered to put the computer in the SLOW mode which is required & all I had was a dark screen for a while. I remembered on the third sinking.

I hope some of you find this exercise useful, your comments will be greatly appreciated. Subsequent articles could cover 'creative' improvements. If you don't have the foggiest notion of what LD A,(FRAMES) means and have a copy of an assembler you should be able to learn SOMETHING by giving it a try. Sooner or later you will have to get a book and find out what's going on. 73's & good luck.. Bo - W4GHV (505-523-2063).

P.S. MANY THANKS FOR ALL THE COLOR INTERFACE PROGRAM COPIES - MORE DETAILS IN NEXT ISSUE.

W4GHV - ASSEMBLY LANGUAGE MADE SIMPLE

```
ASSEMBLE AND PRINT

PASS 1

PASS 2

200                 ORG $5CBC
201                 REL $4082
205  4082 8D80     TITLE DEFW $8
08D
206  4084 ADAE      DEFW $AEAD
207  4086 ACAD      DEFW $ADAC
208  4088 BCA6      DEFW $A6BC
209  408A BE80      DEFW $80BE
210  408C B7B4      DEFW $B4B7
211  408E A7A7      DEFW $A7A7
212  4090 AAB7      DEFW $B7AA
213  4092 BE80      DEFW $80BE
214  4094 8D80      DEFW $808D
215  4096 8080      DEFW $8080
216  4098 8080      DEFW $8080
217  409A 8080      DEFW $8080
218  409C 8080      DEFW $8080
219  409E 8D9C      DEFW $9C8D
220  40A0 9C9C      DEFW $9C9C
221  40A2 0000     POS   DEFW $0
000
222  40A4 00       LIN  DEFB $00
223  40A5 0000     SCORE DEFW $0
000
224  40A7 00       STAT DEFB $00
226  40A8 00       SEED  DEFB $0
0
228  40A9 3A3440   START LD A,(F
RAMES)
229  40AC 32A840    LD (SEED),A
230  40AF 0690      LD B,$90
240  40B1 3E80     BACK LD A,$80
250  40B3 D7        RST 16
255  40B4 D7        RST 16
260  40B5 10FA      DJNZ BACK
270  40B7 012000    LD BC,$0020
280  40BA ED5B0C40  LD DE,(DFILE
)
285  40BE 13        INC DE
290  40BF 218240    LD HL,TITLE
295  40C2 EDB0      LDIR
300  40C4 1B        DEC DE
305  40C5 ED53A540  LD (SCORE),D
E
310  40C9 2A0C40    LD HL,(DFILE
)
315  40CC 118C00    LD DE,$008C
320  40CF 19        ADD HL,DE
325  40D0 22A240    LD (POS),HL
330  40D3 3E04      LD A,$04
335  40D5 32A440    LD (LIN),A
340  40D8 3E08     SCROL LD A,$0
8
345  40DA 2AA540    LD HL,(SCORE
)
350  40DD 23        INC HL
355  40DE 23       LINE  INC HL
360  40DF E5        PUSH HL
365  40E0 D1        POP DE
370  40E1 23        INC HL
375  40E2 011F00    LD BC,$001F
380  40E5 EDB0      LDIR
385  40E7 EB        EX DE,HL
390  40E8 3680      LD (HL),$80
395  40EA EB        EX DE,HL
400  40EB 3D        DEC A
405  40EC 20F0      JR NZ,LINE
410  40EE 2AA240    LD HL,(POS)
415  40F1 7E        LD A,(HL)
420  40F2 32A740    LD (STAT),A
425  40F5 3692      LD (HL),$92
430  40F7 3AA840    LD A,(SEED)
435  40FA 4F        LD C,A
440  40FB CB27      SLA A
445  40FD CB27      SLA A
450  40FF 47        LD B,A
455  4100 CB27      SLA A
460  4102 CB27      SLA A
465  4104 80        ADD A,B
470  4105 81        ADD A,C
475  4106 C60D      ADD A,$0D
```

```
480  4108 5F        LD E,A
485  4109 32A840    LD (SEED),A
490  410C 0E0P      LD C,$08
495  410E AF        XOR A
500  410F 0608      LD B,$08
505  4111 CB13     DIVIDE RL E
510  4113 17        RLA
515  4114 91        SUB C
520  4115 3003      JR NC,UPP
525  4117 81        ADD A,C
530  4118 10F7      DJNZ DIVIDE
535  411A 3C       UPP INC A
540  411B 2AA540    LD HL,(SCORE
)
545  411E 112100    LD DE,$0021
550  4121 19       POINT ADD HL,
DE
560  4122 3D        DEC A
562  4123 20FC      JR NZ,POINT
564  4125 3A3440    LD A,(FRAMES
)
566  4128 CB6F      BIT 5,A
568  412A 3E88      LD A,$88
570  412C 2802      JR Z,BRICK
572  412E C605      ADD A,$05
574  4130 77       BRICK LD (HL)
,A
576  4131 010FFF    LD BC,$FF0F
578  4134 10FE     TIME DJNZ TIM
E
580  4136 0D        DEC C
582  4137 20FB      JR NZ,TIME
584  4139 3AA740    LD A,(STAT)
586  413C FE88      CP $88
588  413E 2812      JR Z,BOOM
590  4140 FE8D      CP $8D
592  4142 202D      JR NZ,KEY
594  4144 2AA540   SCOUP LD HL,(
SCORE)
596  4147 34        INC (HL)
598  4148 7E        LD A,(HL)
620  4149 FEA6      CP $A6
622  414B 2024      JR NZ,KEY
624  414D 369C      LD (HL),$9C
626  414F 2B        DEC HL
628  4150 18F2      JR SCOUP
630  4152 0E85     BOOM LD C,$85
632  4154 2AA240   EXPLO LD HL,(
POS)
634  4157 E5        PUSH HL
636  4158 D1        POP DE
638  4159 3612      LD (HL),$12
640  415B 0605      LD B,$05
642  415D 13       DEPTH INC DE
644  415E 2B        DEC HL
646  415F 71        LD (HL),C
650  4160 EB        EX DE,HL
652  4161 71        LD (HL),C
655  4162 EB        EX DE,HL
657  4163 10F8      DJNZ DEPTH
659  4165 3A2540    LD A,(LAST)
660  4168 FEF7      CP $F7
662  416A C8        RET Z
664  416B 79        LD A,C
668  416C EE80      XOR $80
670  416E 4F        LD C,A
674  416F 18E3      JR EXPLO
676  4171 112100   KEY LD DE,$00
21
678  4174 2AA240    LD HL,(POS)
680  4177 3680      LD (HL),$80
682  4179 3A2540    LD A,(LAST)
684  417C FEFD      CP $FD
686  417E 2807      JR Z,DOWN
688  4180 FEBF      CP $BF
690  4182 2814      JR Z,UP
692  4184 C3D840   GAME JP SCROL
694  4187 3AA440   DOWN LD A,(LI
N)
700  418A FE08      CP $08
702  418C 28F6      JR Z,GAME
704  418E 19        ADD HL,DE
706  418F 22A240    LD (POS),HL
708  4192 3C        INC A
710  4193 32A440   SAV LD (LIN)
A
```

```
712  4196 18EC      JR GAME
714  4198 3AA440   UP LD A,(LIN)
716  419B 3D        DEC A
718  419C 28E6      JR Z,GAME
720  419E 32A440    LD (LIN),A
722  41A1 ED52      SBC HL,DE
724  41A3 22A240    LD (POS),HL
726  41A6 18EB      JR SAV
4000               FRAMES EQU $4
034
4010               DFILE EQU $40
0C
4020               LAST EQU $402
5
4200               BEGIN EQU STA
RT
4300                     END
END OF ASSEMBLY, 0 ERRORS


 104 REM $ HIGHWAY ROBBERY $ ████
████$000        UORNDM▒RND.█Y█NO
T NOT ( IF ▀4  GOSUB ?£RND<5▙RND
 GOSUB ▒. GOSUB ?▒RNDE£RND)▒ ;6▒
RNDY.M▒RNDY▒E▒RND77 FAST SGN 7▀3
  GOSUB ▒ FOR Q█ FOR X4 LIST E▒R
NDU▒RND?ACS BACS B?ACS BACS B█▟L
EN $?M▒RND:▒▙▛▒RCS (*█K▀▟( RUN U
E▒RND)5 ;X4 UNPLOT UORNDACS ?Y▒C
▀LEN ▌?▀? COPY ( RETURN $4 CLS U
▒RND RETURN ▒C> RETURN ▒4HE▒RNDO
▒F/ PAUSE :▌E▒RND FAST SGN Q>▄▛<
F? FOR ? FOR ( SAVE U9RND RETURN
 RUN COS ? INPUT █?/ STOP )5 E▒R
NDQ█U9RND RETURN CLEAR C▛ RETURN
 ▒C=?**RNDU▒RND RETURN ▒C PLOT ;
6▒RNDUM▒RND/ GOTO U▒RNDXC NEW M▒
RND GOSUB ?6▒RND/ FOR X
  105 REM
  106 SLOW
  107 CLS
  108 RAND USR 16553
  109 CLS
  110 STOP
  200 REM   ORG $5CBC
  201 REM   REL $4082
  205 REM TITLE DEFW $808D
  206 REM   DEFW $AEAD
  207 REM   DEFW $ADAC
  208 REM   DEFW $A6BC
  209 REM   DEFW $80BE
  210 REM   DEFW $B4B7
  211 REM   DEFW $A7A7
  212 REM   DEFW $B7AA
  213 REM   DEFW $80BE
  214 REM   DEFW $808D
  215 REM   DEFW $8080
  216 REM   DEFW $8080
  217 REM   DEFW $8080
  218 REM   DEFW $8080
  219 REM   DEFW $9C8D
  220 REM   DEFW $9C9C
  221 REM POS    DEFW $0000
  222 REM LIN   DEFB $00
  223 REM SCORE DEFW $0000
  224 REM STAT DEFB $00
  226 REM SEED   DEFB $00
  228 REM START LD A,(FRAMES)
  229 REM   LD (SEED),A
  230 REM   LD B,$90
  240 REM BACK LD A,$80
  250 REM   RST 16
  255 REM   RST 16
  260 REM   DJNZ BACK
  270 REM   LD BC,$0020
  280 REM   LD DE,(DFILE)
  285 REM   INC DE
  290 REM   LD HL,TITLE
  295 REM   LDIR
  300 REM   DEC DE
  305 REM   LD (SCORE),DE
  310 REM   LD HL,(DFILE)
  315 REM   LD DE,$008C
  320 REM   ADD HL,DE
  325 REM   LD (POS),HL
  330 REM   LD A,$04
```

```
335 REM   LD (LIN),A
340 REM SCROL LD A,$08
345 REM   LD HL,(SCORE)
350 REM   INC HL
355 REM LINE  INC HL
360 REM   PUSH HL
365 REM   POP DE
370 REM   INC HL
375 REM   LD BC,$001F
380 REM   LDIR
385 REM   EX DE,HL
390 REM   LD (HL),$80
395 REM   EX DE,HL
400 REM   DEC A
405 REM   JR NZ,LINE
410 REM   LD HL,(POS)
415 REM   LD A,(HL)
420 REM   LD (STAT),A
425 REM   LD (HL),$92
430 REM   LD A,(SEED)
435 REM   LD C,A
440 REM   SLA A
445 REM   SLA A
450 REM   LD B,A
455 REM   SLA A
460 REM   SLA A
465 REM   ADD A,B
470 REM   ADD A,C
475 REM   ADD A,$0D
480 REM   LD E,A
485 REM   LD (SEED),A
490 REM   LD C,$08
495 REM   XOR A
500 REM   LD B,$08
505 REM DIVIDE RL E
510 REM   RLA
515 REM   SUB C
520 REM   JR NC,UPP
525 REM   ADD A,C
530 REM   DJNZ DIVIDE
535 REM UPP INC A
540 REM   LD HL,(SCORE)
545 REM   LD DE,$0021
550 REM POINT ADD HL,DE
560 REM   DEC A
562 REM   JR NZ,POINT
564 REM   LD A,(FRAMES)
566 REM   BIT 5,A
568 REM   LD A,$88
570 REM   JR Z,BRICK
572 REM   ADD A,$05
574 REM BRICK LD (HL),A
576 REM   LD BC,$FF0F
578 REM TIME DJNZ TIME
580 REM   DEC C
582 REM   JR NZ,TIME
584 REM   LD A,(STAT)
586 REM   CP $88
588 REM   JR Z,BOOM
590 REM   CP $8D
592 REM   JR NZ,KEY
594 REM SCOUP LD HL,(SCORE)
596 REM   INC (HL)
598 REM   LD A,(HL)
620 REM   CP $A6
622 REM   JR NZ,KEY
624 REM   LD (HL),$9C
626 REM   DEC HL
628 REM   JR SCOUP
630 REM BOOM LD C,$85
632 REM EXPLO LD HL,(POS)
634 REM   PUSH HL
636 REM   POP DE
638 REM   LD (HL),$12
640 REM   LD B,$05
642 REM DEPTH INC DE
644 REM   DEC HL
646 REM   LD (HL),C
650 REM   EX DE,HL
652 REM   LD (HL),C
655 REM   EX DE,HL
657 REM   DJNZ DEPTH
659 REM   LD A,(LAST)
660 REM   CP $F7
662 REM   RET Z
664 REM   LD A,C
668 REM   XOR $80
```

CONTINUED ON
PAGE 11

PUBLISHER'S NOTES

I will start off these notes with a few comments generated by the many suggestions sent in with the renewal letters which we have been getting.

Third class mail would be a little cheaper, especially if there were a lot more subscribers than we have now. First class is faster and provides for forwarding as our readers move around. We would rather give better service than save a little money.

It has been suggested that we expand the coverage to other conputer types, but Bo and I just do not have the time to learn much about other computers. It takes quite a bit of time to write a little about what we know, to get your valued contributions in shape to be printed, and to keep track of where all our friends are located. The paperwork is quite time consuming. If we were to expand the demand would be there to produce a more professional job. Bo does prety well, as it is; but he does not have the time to be perfect. If we were to hire help, we would have to charge more; and I do not think the world is ready for yet another high priced computer magazine.

It has been a great pleasure to watch the remewals come in. Bo and I appreciate the kind comments and suggestions which some make. I appreciate those who enclose a mailing label as it makes it easier to put the information into the computer. We are changing over to a new computer with the subscription list. I try not to make any errors, but if the expiration date on your address label does not agree with your records, let us know and we will correct them.

I am impressed by the number who write their letters on the T/S printer; many using the type program which W3ZQN had in the May QZX.

I have just run off the mailing labels for this issue on my computer. I am always impressed. Bo and I have spent much money on computers (not just for QZX). If we had not it would be impossible to do this job.

We have taken another step in the direction of computerization. I can now be reached by computer. Just call (505) 522-8856 and hit ENTER when you get the carrier. Follow the simple sign in directions. Type MSGSYS when you get the A0> prompt. Type ? to get instructions for the message system and leave your message for ALEX BURR.

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

FOR SALE: TS1000 HAM HELPER PROGRAMS - Some written for county hunting and all are in BASIC for easy mods to suit individual taste. Write for details (SASE appreciated) to KA2LHO, Kraig D. Pritts, Box 198, Leonardsville, NY 13364 (see QZX for sample).

FOR SALE: ZX81/TS1000 edgeboard wire-wrap connectors; keyed; bifurcated contacts; manufactured by TI; $5.00 each. Pc piggy-back extender boards; $1.50 each. Economical experimenting with Radio-Shack's 276-158 and 161 project boards and these connectors. Add $0.75 shipping per order. Paul Hunter, 1630 Forest Hills Drive, Okemos, MI 48864.

FOR SALE: HOT Z-II. Assembler, disassembler, single stepping multi-purpose utility program. 16K (minimum) versions for the T/S 1000 and 1500. $24.95 + $2.00 postage. SINWARE, BOX 8032, Sante Fe, NM 87504.

FOR SALE: Three (3) Timex Sinclair 1000 computers with cords, power supply, instruction book, 16K add on RAM. Smoke tested. $50.00 ea + shipping. Al Marsden WN6AOH, 449 No. Concourse, Montebello, CA 90640. (213)721-6298 after 5:30 PM.

QZX FRIENDS

N9AYP -- Lou writes that his T/S 1000 and ZX80 have been joined by a T/S 2068. He is looking for programs for his new computer and is collecting information on packet radio.

WA2LZZ -- Tim is recently back from England and is looking for programs for the T/S 2068, which he has coming.

N1AXQ -- Ben built a ZX81 and added a keyboard. He runs NU4V's cw program.

W1EFK -- Roy says that he has not been able to get his Z Dubber to work with his new T/S 1500.

W5GAA -- Frank says he has had a 2068 since November and thinks its the greatest since the invention of buttermilk! Since 1980 he has had several ZX81's and T/S 100's and has found many very useful articles in QZX. He is very ctive on fast scan television and ays the 2068 produces excellent graphics and color test pattern displays. He enclosed a typical program. Watch for it in QZX.

WB6NKJ -- Gordon says I have too many TS1000's, a Suntronics keyboard, Memotech keyboard, Heathkit line printer, 64K, monitor, inverse video, lots of software, and ready to use it in the shack now! I want to get the QRP/WAS award and want to QSO with anyone on 7.05-7.10 Mhz, 7PM (PDT) Saturdays/Sundays. Heathkit HW7, 4BTV vertical.

WB9YTG -- Tom says he has a kit ZX81 and the NU4V CWSS program which have provided him with many interesting QSO's.

W6VXI -- Buren has a ZX81 with MKIV keyboard with 16K RAM. He is using one of the AF8J RTTY-ASCII tapes and is working on an interface board for his old 35 TTY.

WA2RUW -- Jerry has a T/S 1500 nd 2040 printer in addition to ZX81 and 16K RAM. He has had a little trouble with the stored messages on NU4V's cw program.

W4GHV
(CONTD)

```
 670 REM  LD C,A
 674 REM  JR EXPLO
 676 REM KEY LD DE,$0021
 678 REM  LD HL,(POS)
 680 REM  LD (HL),$80
 682 REM  LD A,(LAST)
 684 REM  CP $FD
 686 REM  JR Z,DOWN
 688 REM  CP $BF
 690 REM  JR Z,UP
 692 REM GAME JP SCROL
 694 REM DOWN LD A,(LIN)
 700 REM  CP $08
 702 REM  JR Z,GAME
 704 REM  ADD HL,DE
 706 REM  LD (POS),HL
 708 REM  INC A
 710 REM SAV LD (LIN),A
 712 REM  JR GAME
 714 REM UP LD A,(LIN)
 716 REM  DEC A
 718 REM  JR Z,GAME
 720 REM  LD (LIN),A
 722 REM  SBC HL,DE
 724 REM  LD (POS),HL
 726 REM  JR SAV
4000 REM FRAMES EQU $4034
4010 REM DFILE EQU $400C
4020 REM LAST EQU $4025
4200 REM BEGIN EQU START
4300 REM        END
```

FROM
SYNC MAG

HEX CODES FOR "HIGHURY ROBBERY"

```
8D   80   AD   AE   AC   AD   BC   A6
8E   00   B7   B4   A7   A7   AA   B7
8E   80   8D   80   80   80   80   80
80   80   80   80   8D   9C   9C   9C
00   00   00   00   00   00   00   3A
34   40   32   A5   40   06   90   3E
80   D7   D7   10   FC   01   20   00
ED   5B   0C   40   13   21   62   40
ED   B0   1B   ED   53   A5   40   2A
0C   40   11   94   00   19   22   A2
40   3E   04   32   A4   40   3E   08
2A   A5   40   23   23   E5   D1   23
01   1F   00.  ED   B0   EB   36   80
EB   3D   20   F0   2A   A2   40   7E
32   A7   40   36   92   3A   A8   40
4F   CB   27   CB   27   47   CB   27
C8   27   80   81   C8   0D   5F   32
A8   40   0E   06   AF   06   08   CB
13   17   91   30   03   81   10   F7
3C   2A   A5   40   11   21   00   19
3D   20   FC   3A   34   40   CB   6F
3E   88   28   02   C6   05   77   01
0F   FF   10   FE   0D   20   FB   3A
A7   40   FE   86   28   12   FE   8D
20   2D   2A   A5   40   34   7E   FE
A6   20   24   36   9C   26   18   F5
0E   85   2A   A2   40   E5   D1   36
12   06   05   13   2B   71   EB   71
EB   10   F6   3A   25   40   FE   F7
C8   79   EE   80   4F   18   E3   11
21   00   2A   A2   40   36   80   3A
25   40   FE   FD   28   07   FE   BF
28   14   C3   D8   40   3A   A4   40
FE   06   28   F6   19   22   A2   40
3C   32   A4   40   18   EC   3A   A4
40   3D   28   E6   32   A4   40   ED
52   22   A2   40   18   EB

TOTAL = 30051
```

FROM
SYNC MAC

```
Label     Instruction
CAR-POS
CAR-LIN
SCORE
CAR-STAT
SEED

 START    LD A,(FRAMES)
          LD (SEED),A

 BLACK    LD B,90h
          LD A,80h
          RST 10h
          RST 10h
          DJNZ,BLACK

          LD BC,32
          LD DE,(D-FILE)
          INC DE
          LD HL,16514
          LDIR

          DEC DE
          LD (SCORE),DE

          LD HL,(D-FILE)
          LD DE,148
          ADD HL,DE
          LD (CAR-POS),HL
          LD A,4
          LD (CAR-LIN),A

SCROLL    LD A,8
          LD HL,(SCORE)
          INC HL
  LINE    INC HL
          PUSH HL
          POP DE
          INC HL
          LD BC,31
          LDIR
          EX DE,HL
          LD (HL),80h
          EX DE,HL
          DEC A
          JR NZ,LINE

          LD HL,(CAR-POS)
          LD A,(HL)
          LD (CAR-STAT),A
         .LD·(HL),92h
          LD A,(SEED)
          LD C,A
          SLA A
          SLA A
          LD B,A
          SLA A
          SLA A
          ADD A,B
          ADD A,C
          ADD A,0Dh
          LD E,A
          LD (SEED),A
          LD C,8
          XOR A
          LD B,8
DIVIDE    RL E
          RLA
          SUB C
          JR NC,+3
```

```
Label     Instruction
          ADD A,C
          DJNZ,DIVIDE .
          INC A
          LD HL,(SCORE)
          LD DE,21h
  POINT   ADD HL,DE
          DEC A
          JR NZ,POINT

          LD A,(FRAMES)
          BIT 5,A
          LD A,88h
          JR Z,BRICK
          ADD A,
  BRICK   LD (HL),A

   TIME   LD BC,FF01h
          DJNZ,TIME
          DEC C
          JR NZ,TIME

          LD A, (CAR-STAT)
          CP 88h
          JR Z,BOOM
          CP 8Dh
          JR NZ,KEY
SCOREUP   LD HL,(SCORE)
          INC (HL)
          LD A,(HL)
          CP A6h
          JR NZ,KEY
          LD (HL),9Ch
          DEC HL
          JR SCOREUP

   BOOM   LD C,85h
EXPLODE   LD HL,(CAR-POS)
          PUSH HL
          POP DE
          LD (HL),12h
          LD B,5
  DEPTH   INC DE
          DEC HL
          LD (HL),C
          EX DE,HL
          LD (HL),C
          EX DE,HL
          DJNZ,DEPTH
          LD A,(LAST-K)
          CP F7h
          RET Z
          LD A,C
          XOR 80h;LD C,A
          JR EXPLODE

    KEY   LD DE,21h
          LD HL,(CAR-POS)
          LD (HL),80h
          LD A,(LAST-K)
          CP FDh
          JR Z,DOWN
          CP BFh
          JR Z,UP
   GAME   JP SCROLL
   DOWN   LD A,(CAR-LIN)
          CP 8
          JR Z,GAME
          ADD HL,DE
          LD (CAR-POS),HL
          INC A
   SAVE   LD (CAR-LIN),A
          JR GAME
     UP   LD A,(CAR-LIN)
          DEC A
          JR Z,GAME
          LD (CAR-LIN),A
          SBC HL,DE
          LD (CAR-POS),HL
          JR SAVE
```

FROM SYNC

Listing 2. The hex loader.

```
10 REM XXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXX
 20 FOR A=16514 TO 16807
 30 SCROLL
 40 INPUT A$
 50 POKE A,(CODE A$-28)*16+CODE
A$(2)-28
 60 PRINT A;"  ";A$
 70 NEXT A
```

73, W4GHV and K5XY

QZX presents the best software and hardware projects available for the radio amateur. While the contents are believed to be accurate, no warranty is extended on any program or project. No investigation has been made of the claims or reputation of any advertiser. It would be greatly appreciated if all correspondance requiring an answer would be accompanied by a self stamped envelope (SASE). Copyright by QZX, 1983. All rights reserved, Photocopying by permission only.

```
******************************************
* Please send me QZX for 1 year,         *
*starting immediately. Enclosed is       *
* $12.00 for first class                 *
* mailing. (Those with addresses
* not in Canada, the U.S, or Mexico      *
* send $19.00 in U.S. funds for          *
* air mail delivery.  Thanks      (02/84)*
*                                        *
*  Name .................................*
*                                        *
*  Call .................................*
*                                        *
*  Address ..............................*
*                                        *
*  City .................................*
*                                        *
*  State.......... ZIP...................*
******************************************
```

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